Letters to the Editor: Comments

LCA from a Sustainability Perspective

Comments to 'LCA and Post-hoc Application of Sustainability Criteria' by Paul Upham

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1. In a commentary in Int. J. LCA (UPHAM 2000), the potential for integrating basic principles for sustainability with LCA has been studied, using The Natural Step as an example. We have previously studied such principles (HOLMBERG et al., 1996; ROBÈRT et al., 1997), and described how to apply them for planning towards sustainability (HOLMBERG, 1998; HOLMBERG & ROBÈRT, 2000). The principles for ecological sustainability are elaborated upon from only three basic mechanisms by which nature can be destroyed, followed by a 'not' inserted in those mechanisms. The principle for social sustainability, is simply stated as the requirement to meet human needs within the frame set by the principles for ecological sustainability:

In a sustainable society, nature is not systematically subject to

1. increasing concentrations of substances extracted from the Earth's crust,
2. increasing concentrations of substances produced by society,
3. physical degradation,

and, within that frame

4. human needs are met world-wide.

These system conditions do not replace the collection of data. Nor do they represent a substitute for various tools for sustainable development. Instead, these principles can be used in a dynamic way to structure information and design tools that are relevant for decision making, thereby increasing the utility of data and tools (ROBÈRT, 1999). One major advantage of having access to basic principles for the favorable outcome of any planning procedure (in this case sustainability) is that it is helpful for the discovering of upstream causes to problems at hand. Understanding basic principles for sustainability makes it easier to discern all the social and ecological impacts currently violating them. One can then move to solve problems upstream rather than fixing symptoms downstream one-by-one as they appear. The other major advantage is that the same principles can also be used for the evaluation of the suggested 'solutions' to the problems. The part of the planning that concerns determining goals can be critically assessed, so that fixing problems by more or less expensive means does not lead into dead ends. This is called 'backcasting' and allows the starting point of planning to be a principle description of a successful outcome, and then to proceed in the planning by asking 'what shall we do to get there?' In this way, what is considered to be economically 'realistic' today is only allowed to determine the pace of transition, not its direction. This is the essence of backcasting.

2. Before we reflect on Upham's comments , we should just briefly mention the rational for also applying backcasting to LCA (ANDERSSON et al., 1998). Much of the LCA work today is based on impact-assessments in nature, e.g. calculations based on how different product alternatives are influenced by today's use of fossil fuels in electricity production and for transportation. From a backcasting perspective, these LCA should be complemented with assessments that assume that the product or process exists in a sustainable society. What parameters are likely to change when the whole society approaches a sustainable metabolism?

3. Upham, correctly, raises three problems with an integration of the System Conditions (or – assumably – any other potential form of basic principles for sustainability) with LCA:

(i) The System Conditions can only be used to bring normative aspects to the planning procedure. As yet, there are no impact categories available that can directly be applied for the linkage of LCA with basic principles for sustainability. The area between the principles, on the one hand, and parameters for an individual firm that are relevant with regard to these principles on the other, must be investigated until this can be done.

(ii) All data that are relevant from a sustainability perspective (for instance 'data on land use...') are generally not available.

(iii) "Basic principles for sustainability could be used to estimate the current, total input, waste output and biotic impact beyond which the firm is not to grow. TNS norms could frame LCA methods that do meet SETAC's protocols, to function as post-hoc sustainability criteria". Upham concludes that it is debatable if there are really any firms that are genuinely willing to accept such a challenge.

4. We agree in all these points raised by Upham, and find them helpful to structure future work along these lines. Below, we have made an attempt to respond to Upham's points, one by one:

(i) The normative aspects of basic principles for sustainability can be used to inform the choice and design of activities and

tools for sustainable development. The first step is to translate the basic principles for sustainability into overall objectives for the firm: "we are going to develop our activities, so that we, step-by-step, decrease our *contribution* to I. today's systematic concentration-increases in nature of matter from the Earth's crust, II. today's systematic concentration-increases of compounds produced by society, III. today's systematic physical degradation of productive ecosystems by society, and IV today's societal inefficiency in meeting human needs everywhere." The point is that a company can generally not – by itself – violate principles for sustainability. However, by asking questions about how the company today is *contributing* to the violation of such principles, flows that are critical from a sustainability perspective can then be assessed. After the detection of flows that are *qualitatively* relevant for sustainability in this way, quantitative measures and tools to assess the phase out of these flows can be developed. The goal for certain flows – like CFCs and mercury – may for instance be a complete phase out, and the goal for other flows – like NOx in an area where nitrogen compounds are only accumulating relatively slowly – may be to decrease the flows by a factor that is determined in negotiations with the other contributors in the same area – for instance through introducing trade of regional emissions' rights. The normative aspects of the *state* of sustainability (system conditions) relate to the *process* of reaching this stage (strategic principles for sustainable development). This understanding is helpful for the qualitative determination of operational practices and activities, as well as for the design of tools – qualitative as well as quantitative – to ensure that a transition really makes a firm approach to ecological and social sustainability (ROBÈRT, 1999). One example on how such thinking can be helpful in the design of tools are results from a study on how to assess a product-development process from an LC perspective (BYGGETH et al., 2000; HOLMBERG et al., 2000). A set of questions are designed to help detect, through the full LC of a planned product, such flows that are qualitatively critical from a perspective of backcasting from sustainability principles. Later on, quantitative aspects can be added to this tool, to further the applicability for a more direct LC assessment.

(ii) It is true that all data that would follow from a complete assessment of all system conditions are not always available. However, the lack of data, in itself, is not a rationale for not asking the right questions. On the contrary, if LCA is going to be applied for strategic planning, it is an advantage if the 'holes' in the LCA – seen from a sustainability perspective – are discovered and not hidden. Lack of data is a problem for determining whether LCA is performed in a perspective that is limited in time and space or not.

(iii) It is correct that the assessment of any firm - seen through a lens of sustainability principles – may be challenging or even provocative. However, on the condition that strategic thinking is applied, there is an often neglected self-interest in knowing if a course is steadily approaching compliance with sustainability or not. Backcasting from sustainability principles is a method to get early warning signals for situations where long-term investments based on today's structures can lead to dead ends and where marginal changes are not enough, i.e. when technological or infrastructural leaps or shifts are required. Marginal changes can be counter-productive, even if they are reducing today's impact on nature. Marginal changes of an old system can lock up resources that could be used in a strategically smarter way. In what ways can a firm suffer from such alleys that are "blind" from a sustainability perspective? If a firm is systematically part of the problems rather than of the solutions – contributing relatively more to society's violation of the system conditions – it is easy to demonstrate relatively larger risks for that firm to be 'hit' economically by increased costs for purchasing resources, waste management, taxes, insurance, loans, and to a loss in market share to those who plan skillfully towards a sustainable future (HOLMBERG & ROBÈRT, 2000).

5. In conclusion, traditional LCA, when focusing on impacts in nature, can be helpful to monitor improvements from today's perspective. However, when we want to evaluate alternative products to discover the routes that are most feasible to *evolve* towards sustainability, thereby applying a strategic perspective, we need to complete the LCA with qualitative assessments that follow from principles for sustainability.

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